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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/046,129	10/26/2001	Gerry M. Kane	9680.184US01	9235

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EXAMINER	
LEE, DAVID J	

ART UNIT	PAPER NUMBER
2633	

DATE MAILED: 10/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/046,129	KANE, GERRY M.	
	Examiner	Art Unit	
	David J. Lee	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-31 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) 1-8,10-20 and 23-26 is/are rejected.

7)☐ Claim(s) 9,21-22,27-31 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 26 October 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 04/03/02.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: on page 2, line 28, "4,061,556" should be changed to "4,016,556".

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3-6, 10-11, 14, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fulenwider (US Patent No. 4,016,556) in view of Shnier (US Patent No. 6,590,661).

Regarding claims 1 and 4, Fulenwider discloses a digital vibration transducer for producing a digital signal representative of a vibration of a vibrating member, said transducer comprising: a laser light source for generating a light beam having an optical axis (fig. 2, 26); a reflector disposed across the light beam and defining a reflecting plane at an angle from the optical axis (fig. 2, 38), said reflector being pivotable with respect to a pivot axis extending in said reflecting plane, the reflector reflecting the light beam towards the detection area (fig. 2, 38); a linkage assembly (fig. 2, 46) having a

first and a second end, the first end being operatively connected to the vibrating member (fig. 2, 36), the second end being operatively connected to the reflector offset the pivot axis (fig. 2, 38), said linkage assembly converting the vibration of the vibrating member into a pivoting of the reflector about said pivot axis and sweeping the light beam reflected thereby across the detection area (fig. 2, 20); a sensing and encoding assembly for sensing the light beam in said detection area and producing a digital signal encoded relatively to said sweeping thereof, said digital signal defining the digital signal representative of the vibration of the vibrating member (fig. 2, 20).

Fulenwider differs from the claimed invention in that Fulenwider does not disclose a focusing means for focusing the light beam on the detection area (claim 1), wherein the focusing means comprise an optical arrangement disposed between the laser light source and the reflector (claim 4). However, Shnier, from a similar field of endeavor, discloses a similar transducer with a focusing means for focusing the light beam on the detection area (fig. 1, 112, and col. 6, lines 60-63). Note that the focusing means 112 is disposed between the light source 110 and the reflector 120. Since it is well recognized that focusing the light beam onto the detection area allows for more accurate sensing of the vibrating signals, and it ensures that the light does not diverge too much to be detected by the detector (col. 6, lines 61-62), a person having ordinary skill in the art at the time the invention was made would have been motivated to use the focusing assembly as indicated by Shnier in the system of Fulenwider.

Regarding claim 3, Fulenwider discloses the digital transducer according to claim 1, wherein the pivot axis of the reflector intersects the optical axis of the light beam (As

shown in Figure 2, optical axis of the light beam 14 is horizontal and it intersects the pivot axis of the reflector 38).

Regarding claim 5, Shnier discloses that the optical arrangement comprises a dispersing lens (col. 6, line 53 and fig. 1, 112) and a focusing objective (fig. 1, 112 and col. 6, lines 59-63: ensuring that the light does not diverge too much is focusing the light).

Regarding claim 6, Fulenwider does not expressly disclose that the reflector comprises a substrate of optical glass, and a layer of reflective material deposited thereon, but it is inherent that reflectors have a layer of reflective material so as to reflect light beams and it is obvious that reflectors comprise a substrate of optical glass on which to apply the reflective material to maintain light quality and possess efficient surface reflectivity.

Regarding claim 10, Fulenwider discloses an encoder for encoding the light beam reflected by the reflector (fig. 1, 10); and a light sensor for sensing the light beam after encoding thereof (fig. 1, 20).

Regarding claim 14, Fulenwider discloses the digital transducer according to claim 10, wherein said light sensor is a photodiode (col. 3, lines 21-23), said digital transducer further comprising light redirecting means for redirecting said light pulses (fig. 2, 38: the reflector redirects the light towards the detector 20).

Regarding claim 11, Fulenwider teaches an encoder comprising an elongated plate extending along said detection area (fig. 3, 30), and provided with a plurality of alternating reflective and non-reflective stripes perpendicular to the sweeping of the light

beam and respectively reflecting and preventing reflection of said light beam towards the light sensor, said encoder thereby converting the vibrating of the vibration member into light pulses (col. 4, lines 3-23).

Regarding claim 24, Fulenwider discloses the sensing and encoding assembly comprising a photosensitive array (fig. 2, 30, and col. 3, line 22).

4. Claims 7-8 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fulenwider in view of Shnier as applied to claim 1 above, and further in view of Baum (US Patent No. 3,286,032).

Regarding claim 7, the combination of Fulenwider and Shnier differs from the claimed invention in that Fulenwider and Shnier do not expressly disclose that the digital transducer further comprises a bearing assembly for mounting the reflector about opposite extremities of the pivot axis. Baum, from the same field of endeavor, discloses a bearing assembly for mounting the reflector (fig.1, 5) about opposite extremities of the pivot axis (in order for the reflector of figure 1 to rotate about the pivot axis, it is inherent that it must be secured about opposite extremities of the pivot axis). One of ordinary skill in the art would have been motivated to use a bearing assembly for mounting the reflector about opposite extremities of the pivot axis to rotate the mirror. Therefore, it would have been obvious to an artisan at the time of invention to incorporate the bearing assembly of Baum in the combination of Fulenwider and Shnier.

Regarding claim 8, if not obvious, it is inherent that the bearing assembly of Baum comprises a pair of vee-bearings respectively contacting the reflector at opposed extremities of the pivot axis in order allow pivoting of the mirror about the pivot axis.

Regarding claim 10, Baum discloses a sensing and encoding assembly which comprises: an encoder for encoding the light beam reflected by the reflector (fig. 1, 2); and a light sensor for sensing the light beam after encoding thereof (fig. 8, 29).

Regarding claim 11, Baum discloses said encoder which comprises an elongated plate extending along said detection area (fig. 1, 2), and provided with a plurality of alternating dark and clear stripes perpendicular to the sweeping of the light beam and respectively blocking and allowing said light beam therethrough, said encoder thereby converting the vibrating of the vibration member into light pulses (fig. 2),.

Regarding claim 12, Baum discloses a pulse counter for counting said light pulses (fig. 8, 29).

5. Claim 13 rejected under 35 U.S.C. 103(a) as being unpatentable over Fulenwider in view of Shnier as applied to claims 1 and 10 above, and further in view of Fersht et al. (US Patent No. 6,064,630).

Regarding claim 13, the combination of Fulenwider and Shnier differs from the claimed invention in that Fulenwider and Shnier do not expressly disclose that the light sensor comprises a silicon cell spanning the detection area. Fersht discloses a light sensor comprising a silicon cell (fig. 2A, 53). One of ordinary skill in the art would have been motivated to use a light sensor with a silicon cell because silicon is the best known

semiconductor material and abundant in the crust of the earth and silicon cells are relatively inexpensive and would lower the cost in acoustic systems (col. 2, lines 4-6). Therefore, it would have been obvious to an artisan at the time of invention to incorporate the silicon sensor of Fersht into the modified transducer of Fulenwider and Shnier in order to provide an economically efficient sensor.

6. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fulenwider in view of Shnier as applied to claims 1 and 24 above, and further in view of Duggal et al. (US Patent No. 5,590,090).

Regarding claim 25, the combination of Fulenwider and Shnier differs from the claimed invention in that Fulenwider and Shnier do not expressly disclose that the photosensitive array is a CCD array. Duggal discloses a photosensitive array that is a CCD array (col. 5, lines 35-44). One of ordinary skill in the art would have been motivated to use a CCD array because they have a high degree of sensitivity and they also have frame rates of greater than 100 KHz which provide for successful analysis of acoustic frequencies up to about 50 KHz (col. 5, lines 40-44). Therefore, it would have been obvious to an artisan at the time of invention to incorporate a CCD array such as the one of Duggal for detection in the modified digital vibration transducer of Fulenwider and Shnier in order to provide effective and high-quality detection.

7. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fulenwider in view of Veligdan (US Patent No. 6,014,239).

Fulenwider teaches all the limitations of claim 1 as discussed above except for the limitation of a focusing means for focusing the light beam on the detection area, and regarding claim 2, the limitation that the laser light source is a collimated solid-state laser diode. However, Veligdan, from the same field of endeavor, discloses a similar transducer with a focusing means for focusing the light beam on the detection area (fig. 2, 28). Furthermore, Veligdan discloses that it is conventional to use a solid-state laser as a light source (col. 2, lines 48-49). One of ordinary skill in the art at the time of invention would have been motivated to incorporate a focusing means to focus the light onto the detection area since it is well recognized that focusing the light beam onto the detection area allows for more accurate sensing of the vibrating signals. In addition, one of ordinary skill in the art at the time of invention would have been motivated to use as a light source a solid-state laser diode because diode pumped solid state lasers have numerous advantages derived from the monochromaticity and spatial coherence of the diode source which result in high conversion efficiency, reduced heat load, high beam quality, and good mode match between the pump region and laser mode volume. Other advantages include the compactness, long life and maintenance-free operation of the solid-state laser diode. Therefore, it would have obvious to one of ordinary skill in the art to incorporate the focusing means and the solid-state laser of Veligdan in the system of Fulenwider in order to provide the high beam quality, high efficiency, and reliability that solid state lasers offer, and to provide more accurate detecting results by focusing the light beam onto the detection area.

8. Claims 1, 10-11, 14-20, 23, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fulenwider in view of Kenjyo (US Patent No. 4,422,182).

Fulenwider teaches all the limitations of claim 1 as discussed above except for the limitation of a focusing means for focusing the light beam on the detection area. However, Kenjyo, from the same field of endeavor, discloses a similar transducer with a focusing means for focusing the light beam on the detection area (fig. 3, 22). Since it is well recognized that focusing the light beam onto the detection area allows for more accurate sensing of the vibrating signals, and it ensures that the light converges towards the sensor (col. 3, line 55), a person having ordinary skill in the art at the time the invention was made would have been motivated to use the focusing assembly as indicated by Kenjyo in the system of Fulenwider.

Regarding claim 10, Kenjyo discloses a sensing and encoding assembly comprising: an encoder for encoding the light beam reflected by the reflector (fig. 3, 26 and col. 4, lines 5-8: the encoder is located at the reflecting surface); and a light sensor for sensing the light beam after encoding thereof (fig. 3, 32).

Regarding claim 11, Kenjyo discloses an encoder comprising an elongated plate extending along said detection area (fig. 4), and provided with a plurality of alternating dark and clear stripes perpendicular to the sweeping of the light beam and respectively blocking and allowing said light beam therethrough, said encoder thereby converting the vibrating of the vibration member into light pulses (col. 6, lines 8-18).

Regarding claim 14, Kenjyo discloses a light sensor which is a photodiode (fig. 3, 32 and col. 4, lines 34-38: Kenjyo discloses that a photodiode may be used in place of

the photoelectric transducer), said digital transducer further comprising light redirecting means for redirecting said light pulses (fig. 3, 25: the cylindrical mirror redirects the light pulses).

Regarding claim 15, Kenjyo discloses a light redirecting means comprising a curved mirror extending downstream the encoder (fig. 3, 25), said curved mirror redirecting all of said light pulses towards the photodiode (fig. 3, 25: the curved mirror directs the light pulses towards the photodiode 32).

Regarding claim 16, Kenjyo discloses an encoder comprising an elongated plate extending along said detection area (fig. 4), and provided with a plurality of alternating reflective and non-reflective stripes perpendicular to the sweeping of the light beam and respectively reflecting and preventing reflection of said light beam towards the light sensor, said encoder thereby converting the vibrating of the vibration member into light pulses (col. 4, lines 5-10).

Regarding claim 17, Kenjyo discloses that the light beam has a linear cross-section in said detection area (col. 3, lines 53-54: after passing through the cylindrical lens, the light beam is converted into a band-shaped light beam, which can be considered to have a linear cross-section) extending perpendicularly to the sweeping of the light beam (col. 3, lines 55-56).

Regarding claim 18, Kenjyo discloses that the focusing means comprise a cylindrical lens (col. 5, line 63 and fig. 8, 22). Kenjyo does not expressly disclose that the cylindrical lens is disposed between the reflector and the sensing and encoding assembly, but it is recognized that this difference does not exist as a result of an

attempt by applicant to solve a problem but merely amounts to selection of expedients known to the artisan of ordinary skill as design choices.

Regarding claim 19, Kenjyo discloses that the reflecting surface of the reflector has a curvature (fig. 3, 26: the reflecting surface is cylindrical and therefore has curvature).

Regarding claim 20, Kenjyo discloses a focusing means comprising a cylindrical dispersing lens and a cylindrical focusing objective extending between the light source and the reflector (fig. 3, 22: the cylindrical lens 22 of Kenjyo can be considered both a dispersing lens and a focusing objective since it accomplishes both: it focuses the light towards the reflector and it collimates the light converting the beam into a band-shaped beam).

Regarding claim 23, Kenjyo discloses a sensing and encoding assembly comprising: an encoder for encoding the light beam reflected by the reflector (fig. 3, 26 and col. 4, lines 5-8) , said encoder comprising a plurality of encoding bands extending along said detection area parallelly to the sweeping of the light beam (fig. 4), the linear cross-section of the light beam crossing each of said encoding bands, each of said encoding bands having a plurality of alternating dark and clear stripes (fig. 4, 31, 31',31",30) perpendicular to the sweeping of the light beam and respectively blocking and allowing said light beam therethrough (col. 4, lines 8-18), the stripes of neighboring encoding bands being offset each other, the encoding bands thereby converting the vibrating of the vibration member into offset sequences of light pulses; and a plurality of light sensors each sensing one of said sequences of light pulses (fig. 5, 33-36).

Regarding claim 26, Kenjyo discloses a comparator circuit (fig. 10, 59-62, and col. 7, lines 3-4) for receiving said sequences of light pulses from the light sensors and deducing therefrom said digital signal representative of the vibration of the vibrating member (col. 6, lines 66-68).

9. Claims 9, 21-22, and 27-31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David J. Lee whose telephone number is (571) 272-2220. The examiner can normally be reached on Monday - Friday, 9:30 am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

djl

M. R. Sedighian

M. R. SEDIGHIAN
PRIMARY EXAMINER